

CASE NO.: 1187-1.CIP  
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1. (currently amended) A passive infrared (IR) motion sensor, comprising:  
  
at least a first IR detector outputting a first signal having a first frequency when a moving object passes in a detection volume of the first detector;  
  
at least a second IR detector outputting a second signal having a second frequency when the moving object passes in a detection volume of the second detector, the second frequency being different than the first; and  
  
a processing system receiving the first and second signals and at least partially based on the first and second signals, outputting a detection signal representative of the moving object, wherein the detectors have the same size as each other, the first detector being provided with a first optics defining a first focal length and the second detector being provided with a second optics defining a second focal length different than the first focal length, the second detector not having an optics of the same focal length as the first optics.
2. (original) The sensor of Claim 1, wherein the first and second detectors are housed separately from each other and the first detector monitors a first volume of space that is at least partially optically superposed with a second volume of space monitored by the second detector.
3. (original) The sensor of Claim 1, wherein each detector has two and only two respective elements with the elements being of equal size with each other and with the spacing between the elements of the first detector being the same as the spacing between the elements of the second detector.

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4. (currently amended) A method for discriminating a moving object in a monitored space from a non-moving object characterized by non-constant radiation, comprising:

receiving a first frequency from a first passive IR detector;

receiving a second frequency from a second passive IR detector, the first and second frequencies not being equal, the detectors being of equal size and configuration but having respective optics of different focal lengths such that the first detector has no optics of the same focal length as any optics of the second detector; and

outputting a signal indicating the presence of the moving object only if both the first and second frequencies are substantially simultaneously received, and otherwise not outputting the signal indicating the presence of the moving object.

5. (original) The method of Claim 4, comprising arranging the detectors in respective separate housings.

6. (original) The method of Claim 4, comprising optically superposing a first volume of space monitored by the first detector with a second volume of space monitored by the second detector.

7. (original) The method of Claim 4, wherein each detector has two and only two respective elements with the elements being of equal size with each other and with the spacing between the elements of the first detector being the same as the spacing between the elements of the second detector.

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8. (currently amended) A motion sensor, comprising:

at least a first passive IR detector having two and only two elements defining a first spacing therebetween, the first passive IR detector monitoring a first subvolume of space;

at least a second passive IR detector having two and only two elements defining a second spacing therebetween, the second spacing being equal to the first spacing and all four elements having the same size as each other, the second passive IR detector monitoring a second subvolume of space;  
and

an optics system at least partially optically superposing the first and second subvolumes, the optics system defining a first focal length associated with the first detector and a second focal length associated with the second detector but not with the first detector, the first and second focal lengths not being equal to each other.

9. (original) The sensor of Claim 8, further comprising a processor receiving signals from the detectors.

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Replacement paragraph, page 17, last paragraph:

In addition to determining motion, the logic, for certain of the sensors disclosed herein, may proceed to decision diamond 13[0]8 to determine whether at least a threshold number of coordinates are active at once. In other words, it is determined whether a threshold number of signals are simultaneously received from plural elements of the detectors, indicating a moving object that equals or exceeds a predetermined size. Generally, larger moving objects are human in response to whom it is typically desired to activate the alarm, open a door, or take some other action, whereas smaller moving objects typically are pets for whom no action generally is to be taken. Accordingly, for a larger object as determined at decision diamond 138, the logic moves to block 140 to indicate "target object" and, e.g., activate the alarm 22. On the other hand, if the object is not of sufficiently large size, no action will be taken.

Replacement paragraph, page 9, paragraph beginning on line 25:

Figure 2 also shows a functional diagram of the detectors 28, 30 with elements 32, 34 in accordance with pyroelectric detector principles summarized above, indicating the relative sizes, shapes, and polarities of the subvolumes monitored by the sensor (i.e., a projection of the sizes, shapes, and polarities of the elements) and illustrating that both detectors 28, 30 are mounted in a single housing 35a. Also, Figure 2 shows a schematic symbol diagram representing the elements 32, 34 of the detectors 28, 30 as capacitors with the dots indicating polarity.

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Replacement paragraph, page 12, first paragraph:

In contrast, signal set (b) (reference numerals 56, 58, 60, 62) represents the detector outputs in response to varying-intensity non-focused white light from a stationary source. These signals arise because the responses of the "equal" and opposite elements only roughly cancel each other. As can be appreciated in reference to Figure 4, under these circumstances the frequencies of the element-summed signal 57 and 61 that are respectively output by the detectors 36, 38 are equal and, hence easily discriminated from the dual-frequency signals in set (a), thereby reducing the probability of false alarms arising from such varying-intensity non-focused white light.

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Replacement page 11:

and only two elements (minus and plus) as shown, and all four elements shown in Figure 3a are of equal size, with the spacing between the elements of the first detector 36a being the same as the spacing between the elements of the second detector 38a.

According to the embodiment shown in Figure 3a, the detectors 36a, 38a are provided with respective optics within the optics system 14 that have different focal lengths. In the case where, e.g., the focal length ratio is 2:1, the optics are compound, and the optics associated with the detector 36a can have twice the number of optical elements as the optics associated with the detector 38a. The optics of the detectors 36a, 38a are arranged such that both detectors' monitored sub-volumes occupy at least portions of the same space.

~~In contrast to the embodiment shown in Figure 2, the sensor of Figure 3 produces two signal frequencies regardless of image size, due to complete functional overlapping of unequal size elements. It thus has less dependence on object size to generate a detection than does the sensor shown in Figure 2, which requires that the object be sufficiently large to appear in both monitored sub-volumes.~~

Figure 4 illustrates the signals that are output by the sensors shown in Figures 2 and 3. For simplicity, reference to the detectors 36, 38 shown in Figure 3 will be made. The top two signals 48, 50 in signal set (a) are output by separate elements of the first detector 36 in the presence of motion of a human through the sub-volumes monitored by the detectors, while the signals 52, 54 in signal set (a) are output by separate elements of the second detector 38 in the presence of a moving human. As shown, the frequency of the element-summed detector output signal 49 is different than (and in the example shown is higher than) the frequency of the element-summed detector output signal 53. When the center-to-center spacings bear a

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2:1 ratio, the frequencies of the respective detector output signals likewise bear a 2:1 ratio. Moreover, the first peak of the first detector high frequency signal 49 is substantially simultaneous in time with the maximum positive slope of the second detector low frequency signal 52, in the presence of a moving object. A moving object can be identified by identifying these characteristics (and similar subsequent characteristics of different peak/slope polarity) as being present.

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